Fishing Methods for the Indian Shad [*Hilsa ilisha* (Hamilton)] in the Indian Region

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PART II

(*With 3 text-figures and 7 plates*)

(*Continued from Vol. 56, page 275*)

6. Andhra Pradesh

The most important rivers in Andhra Pradesh where hilsa fishing is carried out are the Godavari and the Krishna. Hilsa is caught from the sea also along the Andhra Coast.

Gill net

Rangoon vala (Rangoon net). This is a drift net introduced from Rangoon, Burma, and is used below the anicuts in the Godavari and Krishna rivers for catching hilsa. In the Godavari, I have seen it being used below the anicuts at Bobberlanka, Maddurlanka, and Bigneshwaram, and I was informed that it is used in a similar manner at Dhowleshwaram also. Each net is 30 metres or more long, about 5 to 5.5 metres broad, and of fine netting with 10 to 13 cm. mesh. The head-line has a series of floats of *Avicennia* roots at regular

intervals while the lower portion is free. At one end of the head-line is a buoy of gourd and the other end is tied to the boat. The boat is manned by two or three persons and one person is in charge of the net. The boat is taken towards the anicut along one side of the river and, on approaching the eddies in the vicinity of the foot of the fall, the buoy is thrown into the river and then the net is paid out, the boat in the meanwhile proceeding to the opposite side trying to keep a course parallel to the anicut. What actually happens is that by the time the whole net is paid out, the boat as well as the net has drifted down a considerable distance. The fish ascending the river towards the anicut get gilled in the net that drifts down in the opposite direction. When the desired distance is traversed downstream, the boat is rowed back towards the opposite shore (from where it first started) hauling in the net and collecting all the gilled fishes. The process is repeated, the catches being more when the flood level is high and the current strong. The whole operation is diagrammatically represented in Plate XVI, fig. 18.

Seines[1]

Pedda ayilu or *Pedda vala.* This is a drag net composed of 6 to 10 pieces, each 30 metres long and 18 metres broad with 2 to 2.5 cm. mesh. The head and ground ropes are made of coir and are provided with wooden floats and brick sinkers respectively. Two six-ton boats pay out the nets simultaneously as they proceed towards the shore describing a semicircle. The end ropes are given to two groups of 30 to 35 men on the bank to be dragged as a typical shore seine. The net is operated in the estuaries of the Godavari River and is reported to bring in heavy catches of hilsa.

Vusa vala. This is a drag net about 460 to 600 metres long and about 3 metres broad with floats about 1.5 metres apart along the head rope. The mesh is about 10 cm. and the ground rope has burnt bricks as sinkers. The net is cast by a couple of boats and then hauled from the bank of the estuary as typical shore seine.

Thelu vala. This is a boat seine about 530 metres long and 2.7 metres broad with 10 to 13 cm. mesh and 350 floats along the head rope and brick weights along the ground rope. It is operated in combination with *kettu vala* below the Godavari anicut when the level of the water begins to fall after the floods. *Kettu vala* is a wall net about 460 metres long and 1.5 metres broad with about

[1] My thanks are due to Mr. I. Ram Mohan Rao, Deputy Director of Fisheries, Andhra, for kindly arranging to furnish the information on the drag nets used for hilsa fishing in Andhra State.

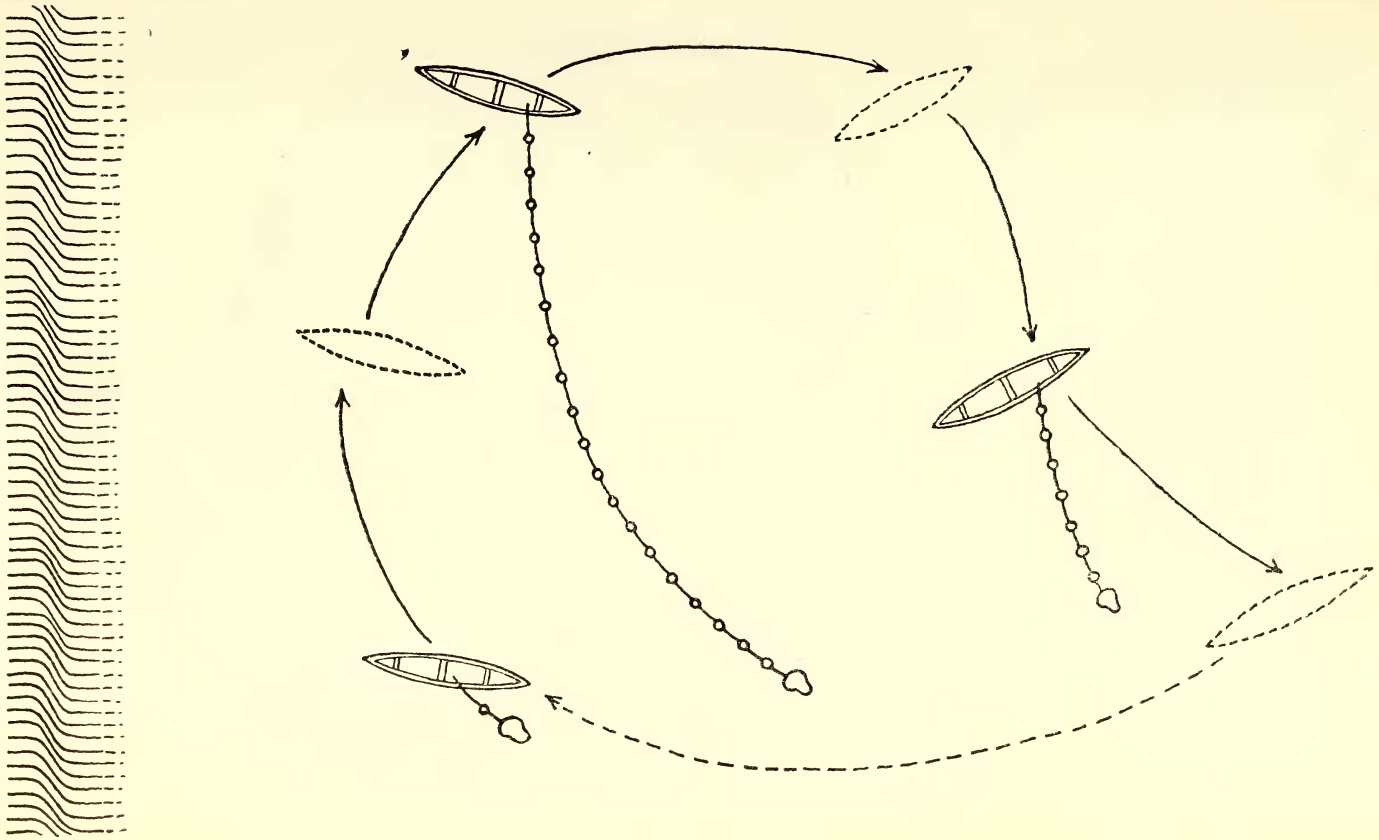


Fig. 18. Diagrammatic representation of the operation of the *Rangoon vala* in the Godavari (Andhra). (By M. Mydeen Kunju).

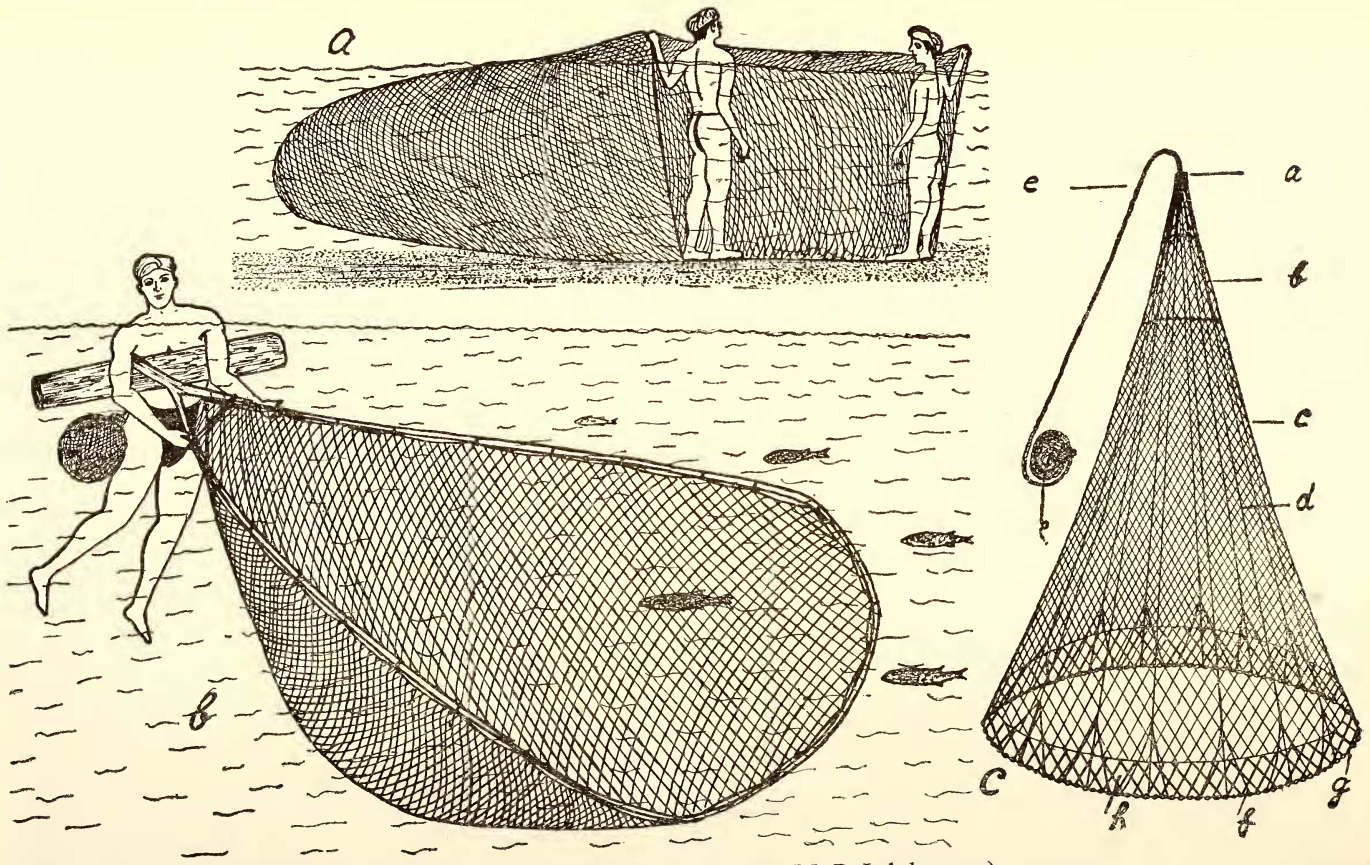


Fig. 19. a.—*Thuri valai* of the Coleroon, Madras. (M. P. Lakshmanan).
b.—*Kappu valai* in the Coleroon, Madras. (Modified from Hornell 1950).
c.—*Veechu valai* of Cauveri Delta. (By M. Kumaran).
a=*Mothiram;* b=*Patsipathal;* c=*Mal;* d=*Vanku-kayir;* e=*Ul-kayir;* f=*Kala-kayir;* g=*Mani;* h=*Velladi.*

10 cm. mesh with coir head rope and ground rope without floats and sinkers. This net is firmly tied to poles fixed across the river below the anicut with the bottom rope close to the river bed. The *thelu vala* is loaded in two boats of 4 to 6 ton capacity with about 6 men in each and is cast some distance away from the *kettu vala* and the two boats proceed towards it making an encircling movement. The *thelu vala* is dragged close to the *kettu vala* and the fish that congregate in the diminishing space are hauled into the boats. The operation is repeated till most of the fish in the particular area are caught.

Pelagic trawl

Iriga vala (Pl. IX, fig. 11 *a*). This has already been described under Orissa (p. 265).

Cast nets

Vessur vala. Two ordinary cast nets are joined together side to side and cast in a circle with the help of two boats. The water is disturbed with bamboo sticks when one side is still open. The nets are then hauled out of water into the respective boats and the fish, if any found inside, is taken out.

7. Madras[1]

The important hilsa ascending river in the Madras State is the Cauveri and its main deltaic branch, the Coleroon. Most of the fishing is done below the lower anicut in the Coleroon. Hilsa is caught during certain months from the sea also. Both *Hilsa ilisha* and *H. toli* occur in the sea off the Coromandel Coast. The *Kappu valai* fishing and the fish drives in the Coleroon have already been mentioned by Hornell (1946 and 1950).

Gill nets

Kanni valai. This is an untanned gill net about 55 metres long and about 3 metres broad. It is made of 14 ply 20 count cotton thread and the mesh is of 3 inches. The head rope has floats of *Calotropis gigantea,* locally known as *erukh* or of *Erythrina indica.* There are 70 floats in all tied at intervals of 12 meshes. The ground rope has weights of burnt clay (5 cm.×2 cm.) at irregular intervals. At one end of the head rope is a long pointed threading peg or

[1] I am indebted to Mr. Ranganathan, Assistant Director of Fisheries, Tanjore, Mr. Balasubramanian, Inspector of Fisheries, Kumbakonam, and Mr. Kesavan, Inspector of Fisheries, Negapatam, for local assistance rendered during my visit to the Cauveri Delta to study the hilsa fishing methods.

korpan-kutchi of the Portia Tree (*Thespesia populnea*) measuring about 50 cm. which is used for gathering the net in folds. The net is held against the current by 8 to 12 persons who stand in a row along the entire length of the net treading on the foot rope. The net portion, known as the *maal*, curves in the form of a bag by the force of the current.

Kettu valai. The *kanni valai* mentioned above is used without the floats and sinkers as a fixed gill net. The head and ground ropes are stouter and these are tied to stakes and fixed in the bed of the river. For a single net about 55 metres long, 8 stakes are fixed equidistant from one another, and the length of one operational unit will depend on the stretch of river to be covered.

Quite often *kanni valai* and *kettu valai* are operated in combination and invariably so at the time of regular fish drives referred to on p. 428.

Rangoon valai or *Ulla valai* or *Ullam valai* or *Kanni valai* (Drift net). This is a drift net of the type used in the Godavari and the Krishna rivers. It is operated in the lower reaches of the Cauveri and its deltaic branches during low tides. Formerly the net was obtained readymade from Rangoon, Burma, and hence the name *rangoon valai.* At present they are made locally from mill-made yarn (equivalent to 10 count 6 ply thread) and is said to be not as effective as the imported ones. The mesh size is 11.5 cm. and an operational unit consists of 6 pieces, each 27 metres long and about 5 metres wide joined together. The head rope has small floats of *Avicennia* roots, 2 metres apart from one another. There are no weights or ground rope. The net is cast across the river and is allowed to drift down with the boat during low tide. Small nets operated in canals are sometimes known as *ulla thundu* or *ullathundu valai.*

Thedachi valai. This is a gill net operated along the Coromandel Coast for all kinds of fishes. During the months of April and May some quantities of hilsa, presumably both *Hilsa ilisha* and *Hilsa toli*, are caught from the sea with this net. In some places including Cuddalore and Pondicherry this is also known as *kanni valai.*

Thedachi valai is a long untanned gill net of 11 cm. mesh made of 3 ply 10 count or 9 ply 20 count cotton yarn. Its length varies from 185 to 460 metres and the breadth is about 3 metres (covered by 24 meshes). The head rope has wooden floats 4 metres apart and the ground rope has stone weights alternating with them. The net is operated from a catamaran with a crew of 3 or 4 persons during night time. After the whole net is paid out, the catamaran is anchored and the fish that get gilled are removed from time to time.

Thuri valai (Pl. XVII, fig. 19 *a*). The net known by this name in the Lower Anicut is quite different from the well-known *thuri valai* of the Coromandel Coast operated in the sea like a pelagic trawl with a pair of catamarans. The *thuri valai* of the Lower Anicut is a simple dome-shaped net of about 7 metres in circumference and shaped into a bag about 1.5 to 2 metres deep when set against the current. It is made of 20 count 12 ply or 10 count 6 ply cotton yarn with a stout cord along the circumference which prevents the net from getting unduly stretched out. The net is held against the current by two persons who tread on the lower margin to keep it close to the bed of the river. It is used close to the anicut and all fishes including hilsa that are carried down by the force of the current get gilled.

Push nets

Kappu valai (Pl. XVII, fig. 19 *b*). This is the simplest type of net in operation and consists of a large oval ring net fixed to the V-shaped (forked) branch of some hardwood tree like *Thespesia populnea*. The height of the net including the handle is from 3 to 3.5 metres and the greatest width from 1.2 to 1.5 metres. The ring is made up of a pair of small bamboos, split or whole as the case may be. The handle is about 46 cm. long and the fork about 30 cm. In some a cross bar is tied across the extremities of the fork to give strength to the frame. The net is made of 20 count 6 ply or 40 count 8 ply cotton thread. The size of the mesh varies from 2.5 to 6 cm., the larger meshed ones being used when operated for hilsa.

The *kappu valai* is used in two ways. When specially used for hilsa at the time of high floods, it is used as drifting push net by a person who floats down the river on a log of wood with the net held in front in which the ascending fish get gilled. The gilled fish are removed and deposited in a palm leaf bag with a detachable lid having a *chevaux de frise* opening which prevents the escape of a fish, or it is killed by biting and threaded on to a cord tied to the waist. After covering some distance the person gets on to the bank, retraces the distance on foot and repeats the process.

It is also used in the manner of a typical dip-net by fishermen who remain standing in the water by the side of open sluices. All varieties of fish including hilsa that congregate in such places are caught.

Cast nets

Veechu valai (Pl. XVII, fig. 19 *c*). This is extensively used in the Cauveri system and perhaps the largest group of fishermen operating

this net is at the Lower Anicut. All kinds of fishes from tiny carp minnows to large sized catfishes are caught with the help of this net. The mesh is quite variable but when mainly used for hilsa large meshed ones are used. The *veechu valai* of the Cauveri Delta is essentially the usual type of cast net of peninsular India. It is made of 20 count 10 ply cotton thread with 6×8 cm. mesh. The depth is about 3 metres and the circumference about 13 to 15 metres. There are about 150 iron weights of about 3 cm. length and 1.5 cm. thickness. Each part of the net has a name and these are indicated in the diagram. It is generally used untanned.

The *veechu valai* is operated in two ways. The commonest method is to remain on the bank or up to waist-deep water close to the shore and cast the net as usual and collect the caught fish in the palm leaf basket hung at the waist. Generally ten to twenty men stand more or less *en echelon* on either side of a pool near the sluice gate and cast the net giving very little chance for any fish in that stretch of water to escape. The other method known as *theppam* veechu (Pl. XVIII, fig. 20) is followed when fishing in deeper waters by a fishing unit of two persons. The fisherman stands on a raft made of about 5 or 6 logs of light wood locally known as *kalyanamaram* (*Erythrina indica*) and another person who wades in the water pushes the raft to the desired place.

Fish drives (Pl. XIX, fig. 21). The fish drives in the Coleroon in the Cauveri delta were events of considerable local importance in former days with the semblance of a *mela* when, unlike as at present, there was greater flow of water and more frequent floods in the river. With the construction of a number of dams and anicuts in the upper stretches of the Cauveri and its tributaries for diversion of water for irrigational purposes, floods are rare and even where they occur are only of very short duration reducing the hilsa fishery to an ephemeral feature.

The method generally adopted is as follows: Stakes are fixed across a selected portion of the river and *kettu valai* is tied to them so as to prevent the escape of fish. A number of *kanni valai* are joined together to cover the width of the river and the whole net is dragged towards the *kettu valai* by a number of fishermen. As hilsa collect together in large numbers in the diminishing space between the two nets, they are removed with the help of dip nets, scoop nets, etc. When the *kanni valai* meets the *kettu valai* the former is lifted up bringing into it most of the remaining fish. Auxiliary nets are brought behind to ensure the capture of the fish that escape from the net in front.

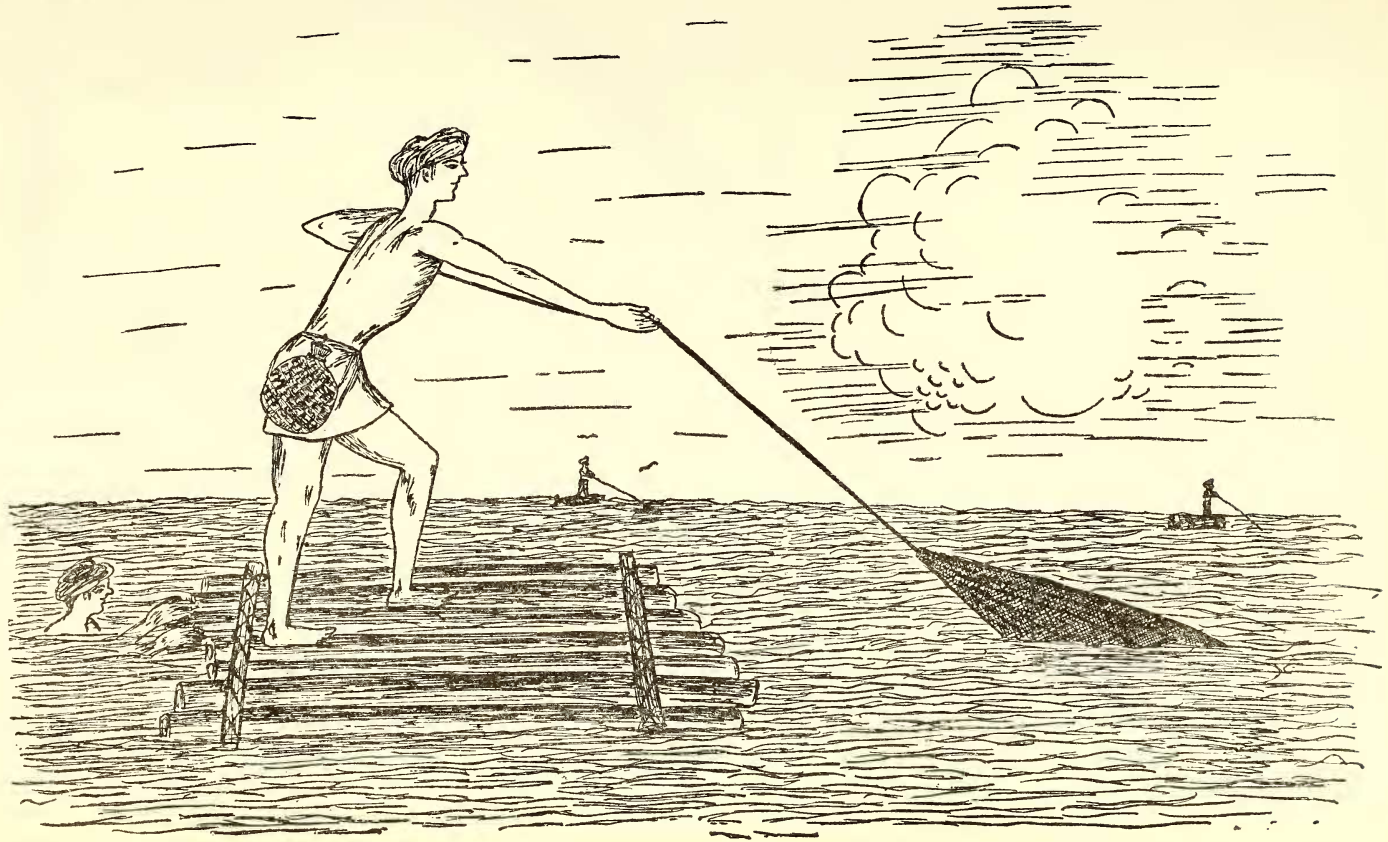


Fig. 20. *Theppam veechu* below the Lower Anicut in the Coleroon, Madras. (By M. P. Lakshmanan).

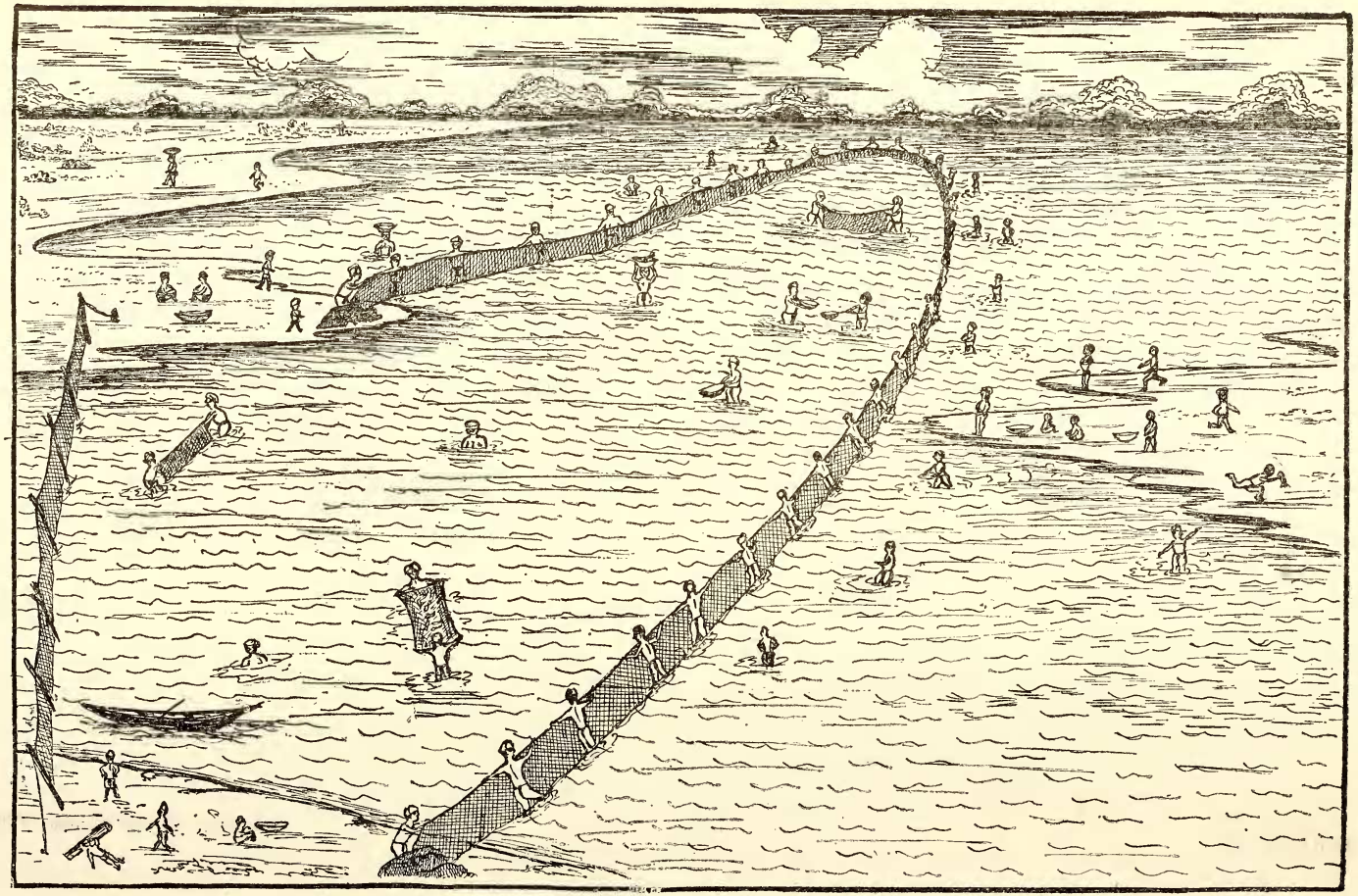


Fig. 21. Fish drive below the Lower Anicut in the Coleroon, Madras. (By M. P. Lakshmanan).

The operation is repeated whenever appreciable quantities of hilsa are known to be present in the river. The fishing rights in the river system are auctioned by the Government and the fish drives are organised by the lessees concerned.

8. Bombay

Kulkarni (1951) has given in fair detail, the methods employed for catching hilsa in Narbada River and its estuary. The fishing methods by the Bhils in the Narbada River have very interesting parallels in the Cauveri and Indus rivers in Madras and Sind respectively.

Gill nets

Budichi jal (Pl. XX, fig. 22 *a*). The fishing done in the Narbada estuary with this sunken drift net has been described by Kulkarni (1951 p. 619) as follows:

'The usual gear employed for large scale capture of hilsa in the Narbada River is sunken drift-nets. They are ordinary drift-nets, but, instead of floating near the surface they are set almost near the bottom and drift at that level. Each piece is about 72 feet long and 7 feet deep. Ten or twelve such pieces are joined together end to end as a single unit and are allowed to drift as a vertical wall. The nets are generally made of twisted hemp with a mesh of 5 inches (stretched mesh). Triangular pieces of burnt clay with a hole in the centre or some other similar articles are tied to the lead line and used as sinkers. About 16 floats, generally made of dry gourds are tied to the cork line (head rope) to keep the entire net erect in the water. The net is similar to the "Palwa jal", or "Hilsa net" described by Pillay (1948), which fishes at the surface. The position of floats on the surface gives the impression that the net is on the surface but actually there is a long string between the floats and the net (text-fig. No. 2). This length is adjusted according to the depth of the water fished so that the net remains in reality near the bottom of the river. In some places the earthen sinkers dangle half a foot below the head line (foot rope), so that the chances of the net getting entangled in bottom debris are reduced.'

'The boats used for the fishing are all flat bottom boats of about a ton in capacity varying from 20 to 30 feet in overall length. Each boat has a crew of three or four, one of whom is a skipper ("tindel") who manages the boat while the others operate the nets. After the net is cast, one end of it is tied to the boat which also drifts along with the net. It is paid out across the stream almost at right angles to the current so that it drifts downwards slowly and the fish swimming

upstream are enmeshed in it. After about half an hour, the net is hauled up to remove the catch and is paid out again for further operations. During spring tide period, these operations are continued day and night, and are suspended only when the catches dwindle towards the end of spring tide period.'

Palwa jal. This net is operated at Kodinar on the Kathiawar coast (Pillay 1948). It is a cotton drift net of 5 cm. to 6.3 cm. mesh made up of 30 to 50 pieces, each piece 28 metres long and 2.7 to 3.7 metres deep with a number of wooden floats tied to the head rope which is about 1.5 cm. thick. The foot rope is thin and without sinkers. The different pieces of netting are tied together by means of the free ends of the head and foot ropes and the composite piece is paid out so as to form a long wall of net drifting with the current. Fishing is carried out in the sea and the net is operated both day and night.

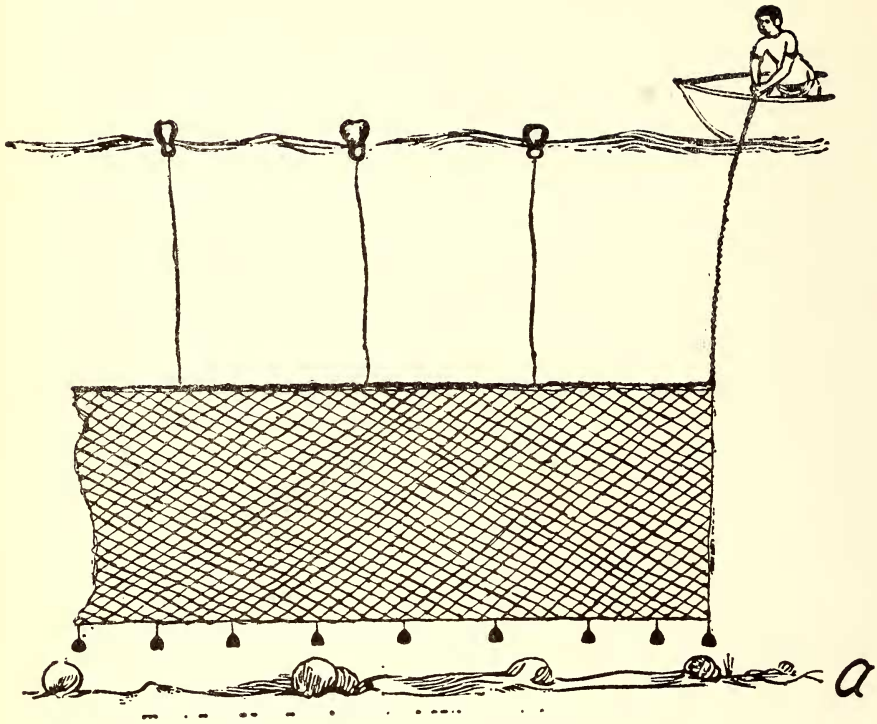
Valli jal. This is a fixed gill net operated in the marine and inshore areas of the Veraval and Porbunder coasts in Kathiawar. The operational net used in the Veraval zone consists of 30 to 40 pieces, each about 31 metres long and 2 metres broad with 10 cm. mesh. The head rope has wooden floats of about 30 cm. long and 7 cm. thick at about 2 metre intervals. The foot rope has no sinkers but the two ends are anchored and buoyed. Yarn of 12 ply 20 counts is used for the net and 12 ply 6 counts for the head line. The fishing season is from August to October and March to May. The net is operated in the early hours of the morning and hilsa is caught along with other fishes.

The *valli jal* of Porbunder zone is a multipurpose drift net operated in the sea from September to November and April to June. Each piece is about 77 to 86 metres long and 3 metres deep with 15 cm. mesh made of 12 ply 20 counts yarn and 7 such pieces are laced together to make one operational net. The head rope has cylindrical wooden floats at 2.5 metres interval.

Khanderi jal[1]. This is a gill net operated during the rainy season in the estuaries and creeks of the Veraval zone. Each piece is about 130 metres long and 3.7 metres deep with 7 cm. mesh made of 6 to 9 ply of 40 to 20 counts yarn. This is also a multipurpose net and hilsa forms one of the catches.

Pankha rach[1]. This is a fixed gill net operated in the estuarine areas of the Jamnagar zone. Each piece is about 29 to 36 metres long and 4.7 to 5.5 metres deep with 9 to 10 cm. mesh and 7 to 8

[1] Information on *valli jal*, *khanderi jal*, and *pankha rach* has kindly been furnished by Mr. K. R. Srivatsa, Director of Marine Products, Rajkot, Saurashtra.



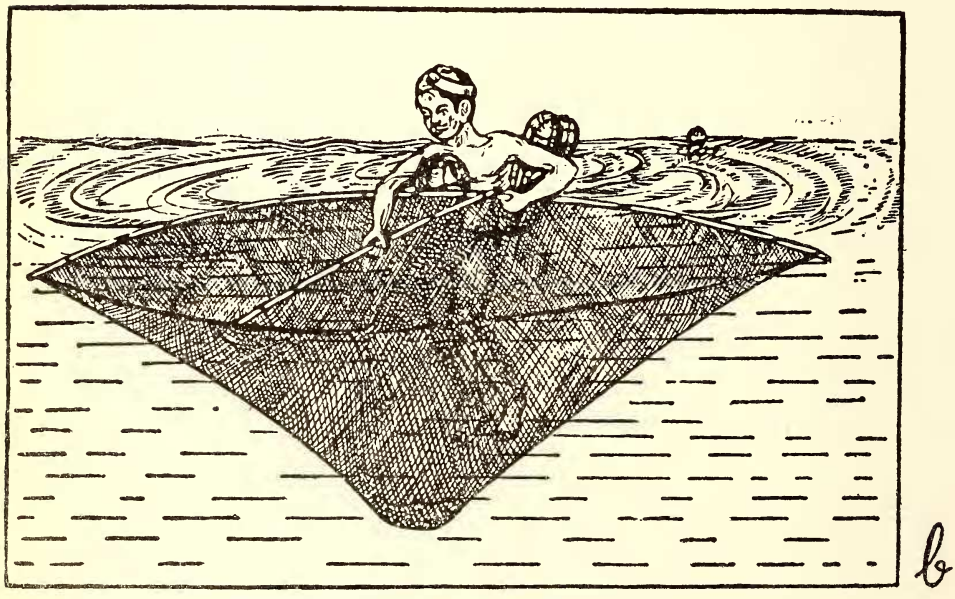


Fig. 22. a.—*Budichi jal* of Bombay. (After Kulkarni 1951).
b.—Operation of the *Jamda jal* of Bombay. (After Kulkarni 1951).

such pieces are laced together and used at a time. The head rope is tied to two poles fixed in the estuary while the ground rope which is provided with sinkers remains pressed against the mud at the bottom. All kinds of fish including hilsa are caught.

Lift net

Jamda jal (Pl. XX, fig. 22 *b*). In principle this is similar to the *kappu valai* fishing by the Cauveri (Madras) fishermen and the *sumbokee* and *matlee* fishing by the Sind fishermen. The fishing has been described in detail by Kulkarni (1951). The 'Bhil' fishermen catch the ascending hilsa with *jamda jal* during high tide when the maximum movement of the fish is expected. The *jamda jal* is a dip net with a loose bag-like net portion and a wooden cross bar across the centre (see Kulkarni op. cit. for particulars). The fisherman with the net in his hands drifts with the current supported on a float of dry gourds encased in a meshwork of coir. As soon as an ascending hilsa strikes the net, it is lifted and the fish is retrieved and secured to a cord with a float at the end tied to the waist of the fishermen. Eight to ten fishermen drift down in a line and cover in one operation a stretch of river about 5 miles long and then walk back to the starting place. Each fisherman gets five to ten fish a day.

II. PAKISTAN

In Pakistan from the hilsa fishery point of view, East Bengal constituting the eastern wing of the country is the most important while Sind lying in the western wing comes next in order.

1. East Bengal

As stated already under West Bengal the fishing methods employed in the two Bengals are the same in principle as well as in details. All the methods enumerated under West Bengal are employed in East Bengal also, except that in view of the vastness of the fishing areas and greater fishing activity, a number of modified methods are in vogue. Ahmad (1952 & 1954) in recent accounts on the fishing gear of East Pakistan and Hilsa Fishery of East Bengal has described briefly the methods employed there for catching hilsa and the relevant extracts from it are quoted here. The description of the *bundh jal* is based on the information furnished by a fisherman who migrated from East Bengal.

Clap nets

Kharki jal. See under West Bengal (p. 252). This is known as *sharki jal* in Pabna and the dimensions of the net which vary in different districts (Ahmad 1954 *a*) are given below:

Rajshahi.—3.7 to 5.5 metres by 3 to 3.7 metres, with mesh of 4 cm.

Pabna.—6.7 to 7.3 metres by 4.5 metres, with mesh of 6.3 cm.

Kushtia.—8.2 metres by 1.8 to 4.2 metres with 5 to 7.5 cm. mesh.

Faridpur.—7.3 to 9 metres by 7.3 to 9 metres with 9 cm. mesh.

Dacca.—9 metres by 4.5 metres with 5 cm. mesh.

Tippera.—6 metres by 7.3 metres with meshes from 4.5 to 5.7 cm.

Shangla jal. See under West Bengal (p. 253). This net is known as *khosh jal* in Bakarganj, *hilsa jal* in Mymensingh, and *lawa jal* in Sylhet. The dimensions of the net in the different districts as reported by Ahmad (1954) are as given below.

In Rajshahi it measures 4.5 to 5.5 metres by 3 to 3.7 metres with 4 cm. mesh, in Rangpur 4 to 4.5 metres by 5.5 to 6 metres with meshes from 5 to 6.3 cm., in Pabna 7.3 by 3.7 metres with 5 cm. mesh, and in Khulna 9 metres by 2.1 metres with 2.5 to 4 cm. mesh. In Kushtia it is 6.2 to 8.2 metres by 1.8 to 2.7 metres with 5 to 7.5 cm. mesh, in Tippera 7.3 to 8.2 metres by 3.7 to 4.9 metres, with 2.5 to 6.3 cm. mesh.

Biri jal. This in principle is similar to the *shangla jal.* Ahmad (1954) has described this net which is used in Mymensingh throughout the year for catching small-sized fish. It is 9 metres long and 14 metres wide, the meshes of the upper part of the net being 6.3 cm. while the meshes of the lower part are as small as .3 cm.

Honga jal. 7 metres long, 3 metres in breadth, with 5 to 10 cm. mesh, is used in the district of Sylhet from April to November for catching hilsa and is similar to the *biri jal* (Ahmad 1954).

Gill nets

Apsha jal has weights attached to its lower rope and nets used in Bakarganj measure 274 metres in length, 6 metres in width, with 2.5 cm. mesh. It is used from November to March for fishing hilsa (*Hilsa ilisha*) and some other species. *Apsha jal* is also used in Faridpur.

Barain jal. 9.5 metres long, 7.5 metres deep, with mesh size of 4 cm. This net is employed in the district of Chittagong in September and October for capturing hilsa.

Chhandi jal. See under West Bengal (p. 254) for the description of the net. In East Bengal it is employed for gilling hilsa from May to October in the districts of Chittagong, Noakhali, Bakarganj, Pabna,

Dacca, Tippera, and Faridpur. The net is laid at night and hauled in the morning (Ahmad 1954).

Chapila jal. Measures 150 metres by 27 metres with 1.3 to 2.5 cm. mesh and is used in the district of Mymensingh throughout the year for catching chapila (*Gadusia chapra*), bhangon (*Mugil* sp.), pangas, and hilsa (Ahmad 1954).

Dar jal measures from 5.4 to 9 metres in length, 4.5 to 8 metres in depth, and has meshes from 4 to 5 cm. It is used in the district of Tippera from April to November for catching hilsa (Ahmad 1954).

Dora jal or *Ilish jal.* See under West Bengal (p. 254).

Era jal is made of Sun-hemp and is used in the district of Bakarganj. It measures up to 723 metres in length, 12 metres in depth, with meshes from 9 to 12.5 cm. It is employed for catching hilsa from May to November (Ahmad 1954).

Har jal is used in the district of Bakarganj by joining a number of pieces to form a net 610 metres long and 22.4 metres deep. The meshes of the nets are 5 cm. It is operated for catching hilsa, silond, pangas, etc., from June to November (Ahmad 1954).

Khot jal is 15.2 metres by 4.5 metres with 5 cm. mesh and is used in the district of Bakarganj from June to November for capturing hilsa (Ahmad 1954).

Pye jal. According to Ahmad (1954) this net is used in Bakarganj throughout the year for catching a variety of fishes including hilsa. It is 274 metres by 6 metres with 2.5 cm. mesh.

Tuni jal is used in the district of Tippera for catching hilsa during the months from April to June. It is 13.7 metres by 6.7 metres and has a mesh of 5 cm. (Ahmad 1954).

Seine nets

Bara jal. See *jagat ber jal* under West Bengal (p. 257). According to Ahmad (1954) this net is also known as *jagat ber*, *gogar* and *maha jal.*

Ber jal. This net is reported to be used both as a drag net as well as a seine net. See under West Bengal (p. 256).

Kona jal or *Bhasha gulli.* See under West Bengal (p. 257). The size of the net differs considerably in the different parts of the country. In Faridpur this net has only one pocket situated at one end. The net alone measures 9 to 10 metres by 6.3 to 11 metres with mesh of 5 cm. (Ahmad 1954).

Chhota ber jal. From the name (*chhota*=small) it means a small *ber jal.* This is used for catching a variety of fishes except in

Bakarganj where this is employed for catching hilsa. The net is about 91 metres by 4.6 metres with mesh of about 4.5 cm.

Dhop jal. This net is used in the district of Bakarganj for catching pangas and hilsa. It is 36 metres by 9 metres with 2.5 cm. mesh and has both floats and sinkers. A number of pieces are joined together for operation and is hauled while still afloat (Ahmad 1954).

Ghai ber jal. This is a very large seine net measuring up to 723 metres long and about 13.7 metres deep with 2.5 cm. mesh used for catching hilsa in the district of Bakarganj from November to April (Ahmad 1954). It has a series of pockets which prevent the fish from escaping.

Gulti jal. The net measures 305 metres in length, 6 metres in depth, and has mesh of 6 cm. It is used in the district of Bakarganj from June to November for catching hilsa. It has both floats and sinkers and has pockets (*ghai*) at the lower end which are formed by doubling up about half metre of the lower margin (Ahmad 1954).

Gultin jal is a hilsa net used in the district of Bakarganj, from April to September for catching hilsa. It is 46 metres long, 13.7 metres deep, with 5 cm. mesh. Like *gulti jal* it has pockets at the lower extremity and is also provided with floats and weights (Ahmad 1954).

Jangla jal. This net is used in the districts of Bakarganj, Pabna, Jessore, and Faridpur. In Faridpur it is 12 metres by 7.3 metres with mesh of 6 cm. and is operated from December to April for catching hilsa and a variety of other fishes. In Pabna the dimensions of the net are 9 metres by 3.7 metres with mesh of 1.3 cm. and the net is used from October to December for catching prawn. A number of pieces of the net are often joined at the time of operation. The lower end of the net is doubled up and is sewn to form pockets. The net is known by the name of *jangalia jal* in Bakarganj. In Pabna the *jangla jal* is used for catching hilsa (Ahmad 1954).

Kochal jal. See under West Bengal (p. 255). 'This net is called *kochal* in Kusthia, Pabna, Rajshahi, Bogra, and Dacca; *dora* and *kochal* in Jessore; and *kochal* and *jangil* in Bakarganj' (Ahmad 1954).

Patan jal. This net is used for catching hilsa in the districts of Pabna and Bakarganj. In Pabna it is 61 metres by 6 metres with 5 cm. mesh and is used from June to August, whereas in Bakarganj it measures 274 metres by 13.7 metres and has 5 cm. mesh. It is used for catching other fishes also (Ahmad 1954).

Tana ber jal. See under West Bengal (p. 256). This net is used in Dacca from September to May for capturing carp and hilsa and measures 152 by 4.6 metres with 5 cm. mesh. It has no sinkers (Ahmad 1954).

Drag nets

Ber jal. See under seine nets (p. 256).

Dara jal. This net measures 274 metres by 4.6 metres and has mesh of 6 cm. and is used for catching hilsa from November to April in the district of Bakarganj (Ahmad 1954).

Trawl net

Jangalia jal. This is a simple type of hand trawl. About a third of a rectangular netting is doubled up and sewn to form a long pocket. The free side of the netting is lashed to a long bamboo pole and sinkers are attached to the doubled up edge which help to keep the mouth of the bag open when the net is operated. Two short ropes with brick weights are tied to the two extremities of the bamboo pole and this helps to keep the upper part of the net at the desired depth when it is pulled along the water. This trawl net is used in Pabna for catching hilsa (Ahmad 1954). It may be recalled here that there is a seine net, a modification of *jangla jal* known by the name of *jangalia jal* in the district of Bakarganj (see p. 434).

Dip nets

Chhakni jal (Fig. 25). This is a small dip net used in the district of Faridpur for capturing hilsa when the fish swims near the banks of rivers (Ahmad 1952).

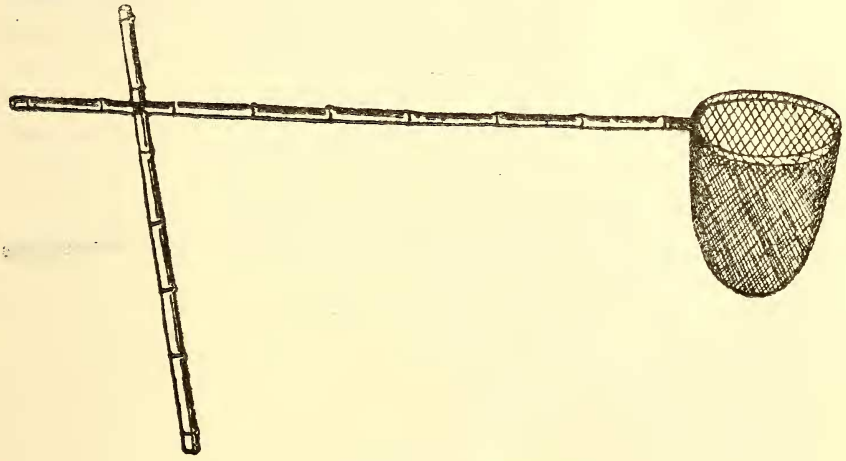


Fig. 25.—*Chhakni jal* of East Bengal.

Bheshal jal or *Khara jal* or *Kadra jal* (Fig. 24). This is a large triangular net with mesh from 1.3 cm. to 4 cm. worked from a bamboo platform erected on the bank of the river or in shallow water.

According to Ahmad (1952) the net is used in Jessore and Tippera for catching hilsa. In principle this is similar to the *gara besal* of West Bengal (p. 260).

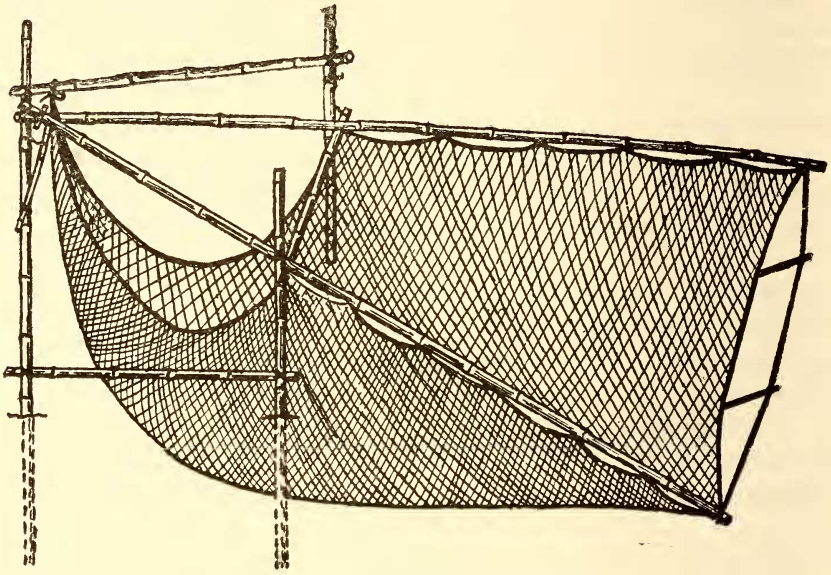


Fig. 24.—*Bheshal jal* of East Bengal.

Hath Bauli jal. This is a small *bhesal jal* of 5 cm. mesh worked by hands from a boat for catching hilsa in the districts of Rajshahi and Pabna during rainy season (Ahmad 1954). Further details about this are lacking and it is not known in what manner it differs from the *nauka bhesal* described under West Bengal p. 261.

Hefa jal or *Hafa jal* (Fig. 26). This is a triangular dip net about 7 metres in length and 3 metres broad at the distal part having a mesh

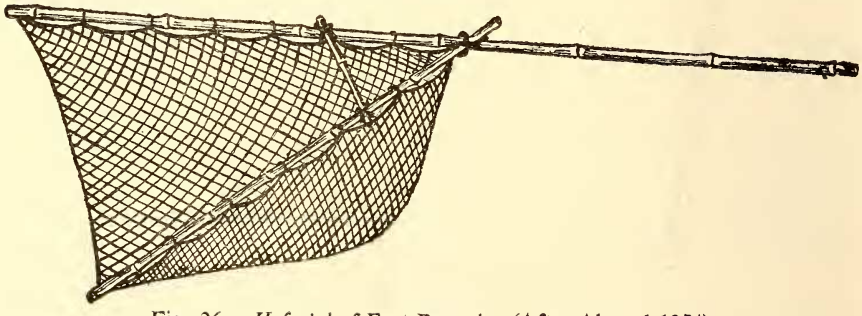


Fig. 26.—*Hefa jal* of East Bengal. (After Ahmad 1954).

of 10 cm. This is used in the district of Sylhet from April to May for capturing hilsa.

Fence net or Pound net

Bundh jal (Pl. XXI, fig. 23[1]). In principle this is somewhat similar to the pound net used for shad in the United States. *Bundh jal* is a fixed net and is generally constructed across large rivers like the Meghna and the Padma. This method of fishing is done from February to May and the most important fish caught in the pound is hilsa. The stakes are removed towards the end of May by which time the effect of monsoon rains begins to be felt in the river.

Long stakes are driven in the form of an arc from one shore across the greater part of the river leaving one side for the passage of boats and launches. In between long stakes shorter ones are fixed and all these are bound together by horizontally placed pieces of sticks. To give additional stability the whole fence is held in position by a series of anchors fixed upstream, their number depending on the force of the current. The end of the fencing away from the shore curves inwards in the form of a circle leaving a small passage for the entry of fish. Close meshed (about 1.3 cm.) netting is fastened to the stakes up to the water line like a wall obstructing the passage of fish either way. Above the water line wide-meshed netting is tied up to a height of about 90 cm. Another wide-meshed netting is tied about 46 cm. above the water line and this is folded over and stretched and attached to distantly placed poles as the chord of an arc leaving a sagging bag-like space in the form of a *verandha* net. The enclosure or the pound at the inner end consists of a single net in the form of a trough with an opening on one side for the entry of the fish. It is open above the water line.

The *bundh jal* is intended to capture fish that migrate upstream against the current. Fishes such as carp, coming against the obstruction, try to overcome it by jumping and get caught in the verandha net. Hilsa on the other hand move along the fence and eventually enter the pound where they remain circling round and round with very little chance of escape through the passage by which they had entered. To remove the fish, the 'pound' is untied from the supporting stakes and the contents emptied into a boat.

Fish drives. Mojumdar (1939) refers to fish drives in the eastern part of the Bay of Bengal during winter months which he describes as follows: 'The other way of catching the hilsa in this part of the country is to drive the shoals into the branch rivers opening in the

[1] The figure is based on a model shown to me by Shri Lakhi Kanth Burman, a refugee fisherman from East Bengal now employed at the Central Inland Fisheries Research Station, Calcutta.

sea by the beating of tins or drums. When they are up in such a *Khal*, their way to the sea is obstructed with nets and they are caught for days together.'

2. Sind

The fishing method for hilsa in the Indus is very similar in principle to that in the Narbada in Bombay and the Cauveri in Madras, but looks somewhat queer and hazardous. The method has attracted the attention of early European travellers as far back as the first half of the 17th century, as is evident from the writings of Sebastien Manrique (Luard and Hosten, 1927) during his travels between 1623-43. In describing the voyage down the Indus to Bakhar he writes:

'We sailed on peacefully in this way, keeping careful watch at night, finding as we advanced on our road an abundance of good cheap provisons in every place we anchored at. In some places, where the stream was shallow, we met many fishermen who furnished us with most excellent shad very cheaply . . . They dispense with the encumbrance of nets and assistants as they go out fishing on large earthen vessels with the circumference of ten to twelve palms in breadth, flattened at the rim, and open at the top in a big, circular aperture just of a size to receive the front of a man's stomach, which being pressed into it checks the ingress of the water. It thus serves as a safe receptacle for the fish as well as a steady base and support for the fisherman, who lies upon it directing his earthen ship with his legs, his hands being busy with the spear, piercing the scaly swimming fishes . . . This abundance of fish was most welcome . . .'

From the above report it appears likely that hilsa was abundant at one time near the surface to be available for spearing and that the water was clear to see the movements of the fish. Spearing is not done now but a modified hand net with a long shaft is used by fishermen who drift on earthen vessels and other floats. Rarely, fishing is also done from boats.

It appears from Day's report (1873) that a triangular type of lave-net known in Sindhi as '*Sumbokee*' which could be closed like a purse net is also in use. He says: 'A species of lave-net is also used and in various ways; their plan of construction is in a triangular frame. In Sind, the fishermen float down the Indus on a gourd or hollow earthen pot, and this net is let down below him; as a hilsa fish, ascending up the muddy stream, strikes against the net, it is

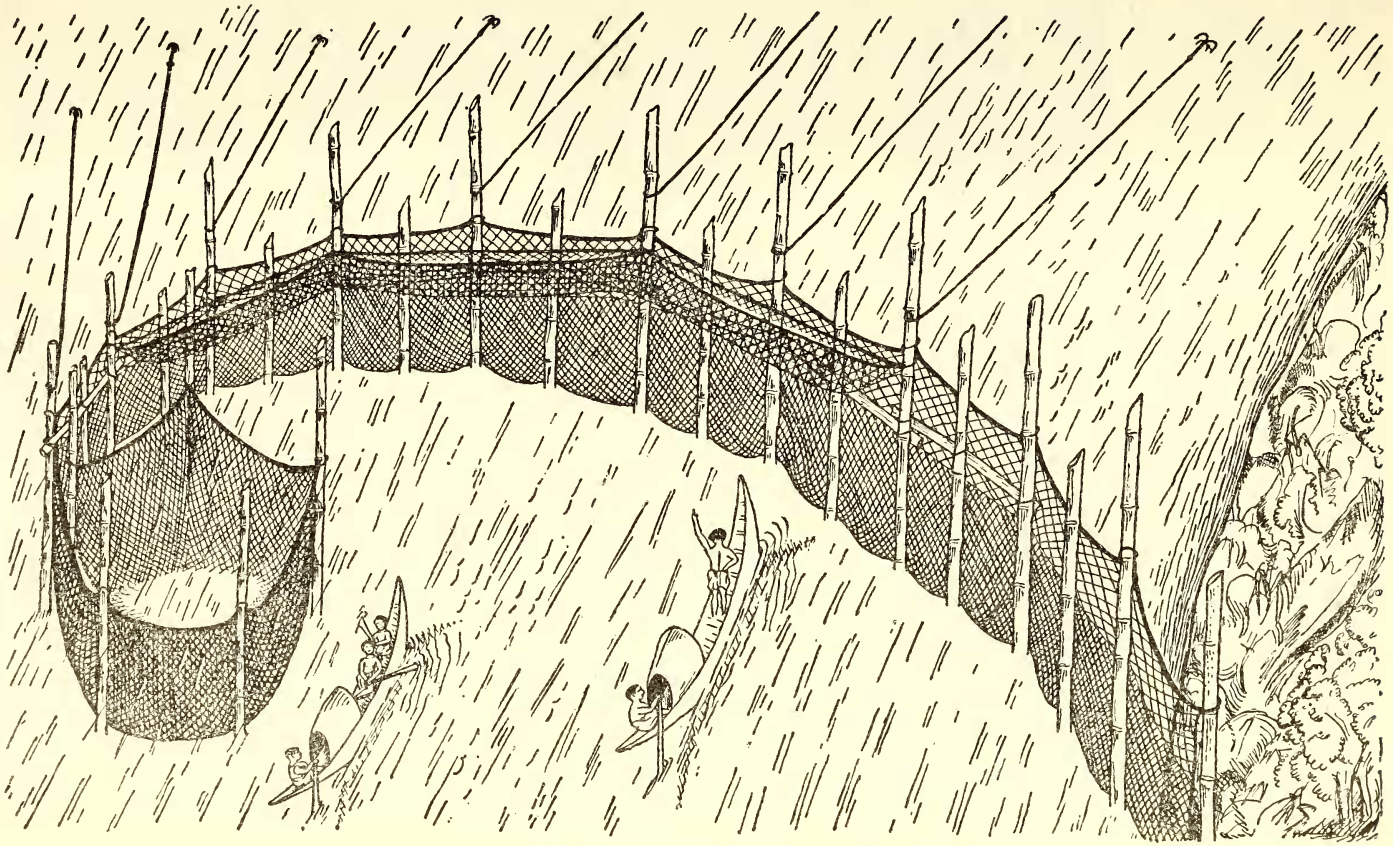


Fig. 23. *Bundh jal* of East Bengal. (By M. Mydeen Kunju).

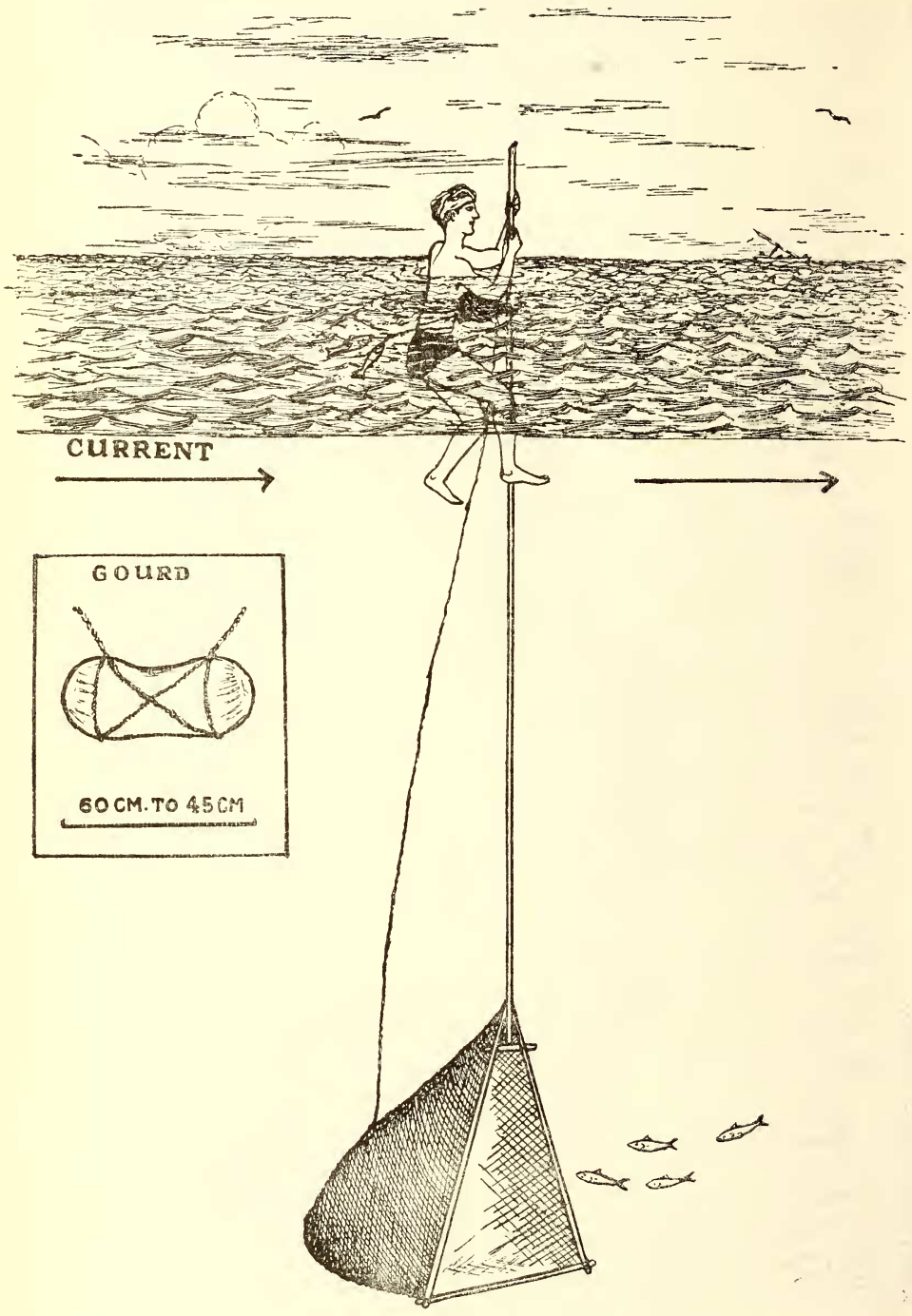


Fig. 27. *Sandh jal* of Sind. (By M. P. Lakshmanan).

made to contract like a purse by means of a string the fisherman holds in his hand.' The observation is repeated in his subsequent account on Indian fish and fishing (Day 1883).

Sandh jal (Pl. XXII, fig. 27[1]). This appears to be the same as the *Sumbokee* referred to by Day (op. cit.). The handle of the net is about 6.5 metres long and each side of the triangular frame is of equal length measuring a little over 2 metres. The mesh size of the net is about 5 cm. The fisherman drifts with the current supporting himself on a dry gourd 45 cm. to 60 cm. in length with the net held almost vertically down. A string tied to the deep bag of the net is held by him and the entry of any fish is communicated through this. By a twist of the handle the fish is imprisoned. The net is lifted up and the captured fish threaded on a string tied to the waist of the fisherman.

Matlee (*Palla pot*). While describing hilsa fishing in the Indus Hornell (1950, p. 109) makes mention of the *palla pot* method. He summarises the fishing activity as follows: 'But the excitement of hilsa-fishing in the Cauveri is as nothing compared with the animated scenes on the Indus, where the Hilsa gives employment to hundreds of fishermen the whole length of Sind. The usual device is a development of the Cauveri one. The net used has grown, however, into the form of a gigantic landing net, with a shaft 20 feet long and with a bag much deeper in proportion. Armed with this the fishermen float downstream, either seated in the bow of a small raft-like punt, or supported by gourds, enveloped in netting and strapped to his back. Or he may, when the fishing reach is short, elect for a third, still more primitive method, and float down the river balanced precariously over the mouth of a great globular chatty or earthenware pot made for the purpose by the village potter. The net is used as on the Cauveri, but in a nearly vertical position. The hilsa, pushing upstream in vehement haste to reach the spawning grounds, blunders into the net and in spite of the extraordinary agility of this fish, man triumphs, being prepared; a sharp twist of the shaft imprisons the fish in the tail of the net and the fisherman, cautiously shortening his grip, finishes it with a knife and consigns it to the bottom of the boat or the depth of the chatty beneath him; if his support is gourds, a needle is passed through the eyes or the gills and

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[1] My thanks are due to Dr. M. R. Khan, Assistant Regional Fisheries Officer, Food and Agriculture Organisation of the United Nations, Bangkok, for having kindly taken the trouble of arranging to get information on hilsa fishing in the Indus, and to Mr. Agha G. Hussain, Deputy Director, Central Fisheries Department, Pakistan, for furnishing a sketch on which Figure 27 in this article is based.

the fish is threaded on a string with the previous victims in tow beside the float.'

'In specially favourable spots, where the river is deep alongside one bank, the fisherman with his net immersed walks downstream along the shore, adjusting his pace to the speed of the current. In the vicinity of towns both the gourd-float and the chatty are preferred to the punt; they give better results and involve practically no expense. The chatty is considered the better killing method, but where the reach within which the fish are caught is long, the fisherman prefers the gourds—their weight is less for the long weary tramp back to his starting-point.'

The *palla pot* has a flattened spheroid shape and is neckless with a comparatively small mouth on which rests the stomach of the fisherman closing it effectively, the latter directing his movements with his hands and legs in a froglike manner. Earthen vessels of smaller size without any opening on which the fishermen float down in a sitting posture is also reported to have been employed (Burns, 1834). The fishermen who cannot afford the 'luxury' of a '*Palla pot*' use a bundle of dry reeds to float down which is discarded on getting water-logged (Wood, 1841). This has the advantage that it need not be carried back but the problem of making a fresh bundle every time remains. A more convenient and perhaps safer alternative commonly employed is the use of a netful of dried gourds strapped to the body. In view of its lightness no serious problem of transportation arises during the trek back to the starting point. The method is very similar to the one followed by the 'Bhil' fishermen of the Narbada.

III. BURMA

Hilsa occurs along the entire coastal waters of Burma from Arakan in the north to the Mergui Archipelago in the south and ascends the rivers for spawning purposes. The information we have on the fishing methods is very meagre and is mainly confined to the observations of Kyaw (1953).

Gill nets

Hmyaw paik[1]. This is a drift net used all round the year in rivers and estuaries of Burma. It is made of cotton yarn and the length varies from 15 to 90 metres and width from 2.7 to 3.7 metres. The mesh is about 10 to 12.5 cm. There are floats along the head rope

[1] The information regarding this net was furnished personally by U Ba Kyaw, Fisheries Officer, Burma.